



MINISTRY OF AGRICULTURE, FISHERIES AND FOOD

Food Additives  
and  
Contaminants Committee

Report on Aldrin  
and  
Dieldrin Residues in Food

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## Food Additives and Contaminants Committee

The terms of reference of the Food Additives and Contaminants Committee are:

"To advise the Minister of Agriculture, Fisheries and Food, the Secretary of State for Scotland, the Minister of Health, and as respects Northern Ireland, the Secretary of State for the Home Department, on matters referred to them by Ministers, in relation to food contaminants, additives and similar substances which are or may be present in food, or used in its preparation, with particular reference to the exercise of powers conferred on Ministers by Sections 4, 5 and 7 of the Food and Drugs Act, 1955 and the corresponding provisions in enactments relating to Scotland and Northern Ireland.

The members of the Food Additives and Contaminants Committee are:

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## Pharmacology Sub-Committee

The terms of reference of the Pharmacology Sub-Committee are:

"To advise at the request of the Committee on Medical Aspects of Food Policy, the Food Additives and Contaminants Committee, the Ministry of Agriculture, Fisheries and Food, the Ministry of Health, the Scottish Home and Health Department, or the Ministry of Health and Social Services Northern Ireland, on the hazard to health, including toxicological and carcinogenic risks, resulting from the use or presence of additives or contaminants in or on food".

The members of the Pharmacology Sub-Committee are:

Professor A. KEKWICK, M.A., M.B., B.Ch., F.R.C.P. (*Chairman*).  
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# FOOD ADDITIVES AND CONTAMINANTS COMMITTEE

## Report on Aldrin and Dieldrin

### Terms of Reference

1. We were asked to advise, in the light of the Report of the Advisory Committee on Poisonous Substances used in Agriculture and Food Storage on Persistent Organochlorine Pesticides, published in March 1964, on whether limits for aldrin and dieldrin should be laid down in foodstuffs, and, if so what these limits should be.

### Recommendations of the Advisory Committee

2. The Advisory Committee *recommended* as follows with respect to aldrin and dieldrin:

1. the use of aldrin and dieldrin in fertilizer mixtures should cease as soon as this can be arranged;
2. the use of aldrin and dieldrin in dips and sprays for sheep should cease as soon as this can be arranged;
3. (a) seed dressings containing aldrin, dieldrin and heptachlor may continue to be used, but only on (i) winter sown wheat (up to the end of December) where there is a real danger of attack from wheat bulb fly, and (ii) on rubbed and graded sugar beet seed for precision drilling;  
(b) aldrin and dieldrin may be available for commercial use only (i) against wireworm in potatoes, (ii) to control cabbage root fly and (iii) to control narcissus bulb fly;  
(c) dieldrin may be available to control cockroaches and tropical species of ants;
4. all other current uses of aldrin, dieldrin and heptachlor in agriculture, horticulture, home gardens and food storage practice should cease as soon as this can be arranged;
5. the uses listed in recommendations 3(a), (b) and (c) above should be reviewed at the end of three years with a view to their discontinuance.

### Voluntary Curtailment of Use

3. The Government accepted the recommendations of the Advisory Committee and, with the co-operation of the interests concerned, has established a voluntary curtailment of the use of these pesticides on the lines of the recommendations. This is set out in detail in Appendix I.

### Available Data

4. We sought from the Advisory Committee their views on the following three questions:

- (a) What level of residues at the time of harvesting or slaughter are likely to occur from the permitted continuing uses of aldrin and dieldrin? (See Appendix I)

- (b) What might be regarded as a likely level of residues in foodstuffs at the time of harvesting or slaughter where the use of aldrin and dieldrin is forsworn having regard to the existing contamination of soil, water or animal feedingsuffs?
- (c) What might be regarded as a likely level of aldrin and dieldrin residues in foodstuffs at the point of retail sales in both the cases mentioned in (a) and (b) above having regard to all other uses of these chemicals?

5. Their answers are set out in Appendix II. From these it will be seen that there is a serious lack of data on aldrin and dieldrin residues. We have also consulted the Pharmacology Sub-Committee on the proposals set out below. Their report is attached at Appendix III.

6. We *recommend* that steps should be taken to increase the information available on the actual amounts of aldrin and dieldrin present in food sold to the consumer. Final recommendations about statutory limits could only be based on the consideration and evaluation of such data.

### The Need for Statutory Limits

7. On the other hand, it is clearly undesirable that there should be no control of the presence of these substances in food and at present such control can only be by means of residue limits. The present agreement on restriction of the uses of aldrin and dieldrin is a voluntary one and, although we have no reason to suppose that it is not being and will not be respected, there is no sanction against any farmer or grower who ignores it. If there is a statutory control of residue limits in addition to the voluntary agreement, it is bound to make everyone very much more careful and restrained in their use of these substances and will make the necessary control by enforcement officers and analysts easier and more effective.

8. Residue limits are the most effective means readily available for dealing with aldrin and dieldrin on imported foods. Since half our food comes from abroad, this is extremely important. Statutory residue limits which could result in the seizure or refusal of cargoes of food containing high residues of aldrin and dieldrin would certainly increase the likelihood of overseas suppliers exercising due care in the use of these substances on crops and animals intended for export to this country. This likelihood might be increased if a representative of the Ministry of Agriculture, Fisheries and Food visited the countries from which food containing aldrin and dieldrin is most likely to be imported, and discussed and agreed procedures for handling the problem with those responsible. We appreciate that such a representative could only use powers of persuasion and would have no further statutory sanction than the residue limits that we propose, but we think that a great deal could be achieved by such visits. Further, importers of food should, where possible, alert their suppliers to the proposed residue limits set out in this report and ask them to take adequate steps to ensure that these limits are not exceeded.

9. We think that the best solution of the problem would be for the use of aldrin and dieldrin, except in certain closely defined circumstances, to be prohibited by law and we *recommend* that this matter should be given urgent

consideration by those responsible. We should like to see all traces of aldrin and dieldrin eliminated from all foods forthwith but we recognise that traces will continue to occur for some time to come, even with a substantially reduced use of these substances and indeed even if their use were discontinued altogether. Because of these considerations and those mentioned in paragraph 6, we *recommend* that our proposals be reviewed in two years' time.

10. We therefore *recommend* that statutory limits for aldrin and dieldrin should be laid down as soon as possible. We recognise that these limits must be rather arbitrary at present because of the limited number of analytical figures available, but we think, for the reasons given above, that they are necessary. We have carefully considered the regulations and experience of other countries and we *recommend* that the statutory limit for foods in general should be set as low as possible and should be 0.1 part per million (p.p.m.). It is necessary however to provide for three exceptions because of special circumstances. As the voluntary ban on the use of aldrin and dieldrin in dips and sprays for sheep did not start until 1st January 1966 and because its effect on levels in mutton will not be fully seen for a few years we *recommend* that in the case of mutton the limit for the time being should be 1.0 p.p.m. in the fat. This should be reviewed in twelve months' time. We should like to be able to recommend that no aldrin and dieldrin be permitted in milk and baby foods but we are aware that with the great sensitivity of analytical methods it has become possible to detect very low residues of aldrin and dieldrin in food and also that at present it would be impossible to produce milk or baby foods that were entirely free from aldrin and dieldrin. For these reasons we reluctantly decide against a zero tolerance and *recommend* that a limit of 0.003 p.p.m. be placed on aldrin and dieldrin in liquid milk, this being the lowest practicable limit of analysis. We *recommend* a corresponding limit of 0.02 p.p.m. in baby foods (including dried milk) which would take account of the difference in residues likely to be found in liquid and dried products. We also *recommend* that all ingredients for baby foods should be chosen by manufacturers with a view to keeping the aldrin and dieldrin content to the lowest possible level. While these limits seem to us realistic, we do not accept them readily or with equanimity. With greater restraint in the use of aldrin and dieldrin, significantly lower statutory limits should be feasible in two years' time.

#### Summary of Conclusions and Recommendations

11. (a) Immediate steps should be taken to increase the information available about amounts of aldrin and dieldrin in foods; (paragraph 6).
- (b) Consideration should be given to a statutory ban on the use of aldrin and dieldrin except in closely defined circumstances; (paragraph 9).
- (c) A statutory limit for total residues of aldrin and dieldrin (expressed as dieldrin) in foods should be laid down as soon as possible; (paragraph 10).
- (d) A limit of 0.1 p.p.m. should be laid down for foods in general; (paragraph 10).
- (e) A limit of 1.0 p.p.m. should be laid down for mutton fat; (paragraph 10).

- (f) A limit of 0.003 p.p.m. should be laid down for liquid milk; (paragraph 10).
- (g) A limit of 0.02 p.p.m. should be laid down for baby foods (including dried milk); (paragraph 10).
- (h) All ingredients for baby foods should be chosen with a view to keeping the aldrin and dieldrin content to the lowest possible level; (paragraph 10).
- (i) The statutory limits for foods in general, liquid milk and baby foods should be reviewed in two years' time and the limit for mutton fat after twelve months; (paragraph 10).

September, 1966

FAC/REP/5

## Permitted Uses of Aldrin and Dieldrin

The voluntary ban on most current uses of aldrin and dieldrin in agriculture, horticulture, home gardens and food storage practice came into effect on 1st January, 1965. Approval has however been given for the following uses to continue:

1. as a seed dressing on winter sown wheat (up to the end of December) where there is a real danger of attack from wheat bulb fly;
2. on rubbed and graded sugar beet seed for precision drilling (dieldrin only);
3. for commercial use only (i) against wireworms in potatoes (ii) to control cabbage root fly on brassicas and (iii) to control narcissus bulb fly;
4. to control cockroaches and tropical species of ants (dieldrin only);
5. to control hoproot weevil (aldrin only);
6. to control leatherjackets—but only on those varieties of spring barley sensitive to D.D.T. (aldrin only);
7. to control strawberry seed beetle (aldrin only);
8. to control bean seed fly—but only on French or kidney bean and runner bean seed (dieldrin only);
9. as a seed dressing against onion seed fly (dieldrin only);
10. to control vine weevil on ornamental plants;
11. as a seed dressing to control bean seed fly on spinach (dieldrin only).

*Notes*

1. All the above uses will be reviewed in 1967.
2. The voluntary ban on use in dips and sprays for sheep came into effect on 1st January 1966.

Replies of the Advisory Committee on Pesticides and  
Other Toxic Chemicals

QUESTION (A)

What level of residues at the time of harvesting or slaughter are likely to occur from the permitted continuing uses of aldrin and dieldrin? (Set out in Appendix I).

ANSWER

(1) *Agricultural and Food Storage Uses*

The figures given below assume that none of the residues come from any previous use. In many cases no suitable data exist; calculations based on the assumption that all the added pesticide appears in the edible portion of the harvested produce will result in residue levels patently inconsistent with those obtained from actual studies.

1. *Veterinary use on sheep as dips and sprays*

Up to 10 p.p.m. (and occasionally higher) are found in renal fat from dieldrin dipped sheep. A marked seasonal variation occurs with the highest residues occurring in animals slaughtered in the third quarter of the year.

2. *Seed dressing on winter-sown wheat*

Usage: 3 oz/acre

Yield: 30 cwt/acre

No residue data available.

3. *Sugar beet seed dressing*

Usage: 0.3 oz/acre

Yield: 10-13 tons/acre

No residue data available.

4i. *Wireworm spray or dust on maincrop ware potatoes*

Usage: 1-3 lb/acre

Yield: 9 tons per acre.

Crops sprayed or dusted with aldrin or dieldrin in 1964 and grown in soil not treated previously with these chemicals, contained the following residues:

skin (15% of tuber)—up to 0.25 p.p.m. aldrin and up to 0.27 p.p.m. dieldrin

flesh (85% of tuber)—up to 0.04 p.p.m. aldrin and up to 0.03 p.p.m. dieldrin

whole tuber —up to 0.1 p.p.m. aldrin plus dieldrin.

Crops sprayed or dusted with aldrin or dieldrin in 1964 and grown in soil previously treated (spray, dust, aldrinated fertiliser) contained the following residues:

skin (15% of tuber)—up to 0.18 p.p.m. aldrin and up to 0.49 p.p.m. dieldrin

flesh (85% of tuber)—up to 0.04 p.p.m. dieldrin

whole tuber —up to 0.13 p.p.m. aldrin plus dieldrin.

4ii. *Root dips to control cabbage root fly*

Usage: 0.73 oz (root dips) to 20.5 oz (plant drenches) per acre

Yield: 3-9 tons/acre

No residue data available.

4iii. *Bulb dips*

No information.

5. *Cockroach and ant control*

No information.

6. *Hop root weevil control*

No residue data available.

7. *Leatherjacket control in DDT-sensitive varieties of Spring Barley*

Usage: 1-2 lb/acre

Yield: 27 cwt/acre

No residue data available.

8. *Strawberry seed beetle control*

No residue data from commercial usage.

From trials using the recommended rate of application of 5 lb. per acre residues not exceeding 0.1 p.p.m. were found.

9. *Bean seed dressing*

Usage: 3 oz/acre

Yield: 4-5 tons/acre

No residue data available.

10. *Onion seed dressing*

Usage: 6.9 oz/acre

Yield: 9 tons/acre

No residue data available.

Uses 2, 3, 4, 6, 7, 8, 9 and 10 above could lead to residues appearing in the soil and subsequently in certain untreated crops grown in that soil. However, it is not known what edible crops, other than potatoes, carrots and possibly strawberries, pick up residues from soil contaminated in this way.

(2) *Veterinary Use*

There will be no permitted veterinary uses of aldrin and dieldrin after the end of 1965 but there may be continuing residues arising from previous veterinary use and from uses permitted for other purposes. The levels that are likely to be found cannot be assessed at present; an assessment must await the results of further survey work.

QUESTION (B)

What might be regarded as a likely level of residues in foodstuffs at the time of harvesting or slaughter where the use of aldrin and dieldrin is forsworn having regard to the existing contamination of soil, water, or animal feeding stuffs?

ANSWER

(1) *Agricultural and Food Storage Uses*

This question has been interpreted as referring to untreated crops which had been grown in a contaminated environment or to animals which had not been treated with veterinary products containing aldrin or dieldrin and which had been reared on untreated feeding stuffs which had been grown in a contaminated environment.

No such levels can be suggested because of the lack of data both on the environmental contamination resulting from permitted uses and on the pesticide residues status of imported animal feeding stuffs. However, the following data, obtained during 1964 on untreated home-produced commodities, may give some indication of the maximum likely residues to be expected from environmental contamination resulting from uses permitted up to the 1st January, 1965.

- i. Sheep understood not to have been treated with aldrin or dieldrin dips: up to 0.4 p.p.m. dieldrin in renal fat.
- ii. Untreated potatoes grown in soil previously treated (dust, spray, aldrinated fertiliser) with aldrin or dieldrin:
  - skin (15% of tuber)—up to 0.07 p.p.m. dieldrin
  - flesh (85% of tuber)—less than 0.01 p.p.m. dieldrin
  - whole tuber —up to 0.02 p.p.m. aldrin plus dieldrin.
- iii. Untreated carrots grown in previously treated soil:
  - skin (20% of root) —up to 0.7 p.p.m. dieldrin
  - flesh (80% of root)—up to 0.02 p.p.m. dieldrin
  - whole carrot —up to 0.2 p.p.m. dieldrin.
- iv. Butter: less than 0.1 p.p.m. dieldrin.
- v. Milk: less than 0.01 p.p.m. dieldrin.
- vi. Lard: up to 0.05 p.p.m. dieldrin.

## (2) Veterinary Use

This question can be answered only when surveys have been made to ascertain the present degree of contamination and that found in the subsequent years after the use of these chemicals in sheep dips has been discontinued. Products of animal origin from all systems of management may be found to contain residues but that surveys of the following foodstuffs from animals and birds kept on free range would be most likely to produce evidence of contamination:—

1. Samples of meat and fat from mutton and lamb produced in the U.K. during 1965 and 1966.
2. Poultry meat and eggs from birds on free range rather than from intensive houses.

## QUESTION (C)

What might be regarded as a likely level of aldrin and dieldrin residues in foodstuffs at the point of retail sale in both the cases mentioned in (A) and (B) above having regard to all other uses of these chemicals?

## ANSWER

### (1) Agricultural and Food Storage Uses

There is no residue data relating to the situation where previous uses had ceased and where samples had been taken at retail level.

The replies to Question (A) at 1, 4i, 8 and Question (B) at i to vi contained information on the residues occurring in a foodstuff at the point of its entry into distribution.

### (2) Veterinary Use

This question can be answered only when sufficient data are available from the surveys suggested in (B) above, together with data from any other source.

## REPORT OF THE PHARMACOLOGY SUB-COMMITTEE

1. The Pharmacology Sub-Committee was asked to comment on certain tolerances for aldrin and dieldrin which had been suggested by the Food Additives and Contaminants Committee and to express an opinion whether these tolerances were toxicologically realistic.

2. In arriving at an arbitrary estimate for these tolerances the Committee took into account, as stated in various sections of the report,

- (i) the findings and recommendations of the Report of the Advisory Committee on Poisonous Substances Used in Agriculture and Food Storage on Persistent Organochlorine Pesticides, published in March 1964,
- (ii) the same Advisory Committee's views on residue levels likely to occur from the permitted continuing uses of aldrin and dieldrin,
- (iii) the likely levels of residues in foodstuffs having regard to the existing contamination of soil, water or animal feeding stuffs,
- (iv) the likely level of aldrin and dieldrin residues in foodstuffs at the point of retail sale having regard to all other uses of these chemicals,
- (v) a desire to see all traces of aldrin and dieldrin eliminated from all foods forthwith and
- (vi) a careful consideration of the regulations and experience of other countries.

3. We have reviewed all available toxicological information on these substances at subsequent meetings and certain conclusions emerged:

- (a) from a toxicological point of view the relative stability and persistence of these pesticides in the environment and their metabolic behaviour in the plant and animal body imply that cumulation of dieldrin in man might be anticipated. Nevertheless, the data provided went some way to allay these apprehensions. In particular there appears to be experimental evidence, as for other substances, that an equilibrium may be reached between the dietary intake, metabolic disposal and body fat storage. Furthermore, the equilibrium level of the accumulated body load of dieldrin depends on the total exposure, principally the dietary intake of aldrin and dieldrin;
- (b) some of the long-term animal experiments have drawn our attention to hepatotoxic and possible carcinogenic properties even at low levels in the diet. We are not yet satisfied that the available evidence allows for an unequivocal decision and we would like to see further work performed to clarify the present position;
- (c) in the light of the above considerations and because of the impossibility of deducing from the available toxicological evidence a maximum no-effect level in animals, and consequently a maximum daily intake for man, we are of the opinion that any positive tolerance level for aldrin and dieldrin cannot at present be based on, or justified by, available toxicological evidence;
- (d) nevertheless, there are sound reasons for recommending that the human dietary intake of aldrin and dieldrin be kept to the lowest possible level. Whether this aim is to be achieved by the setting of arbitrary tolerance levels or any other suitable administrative procedure by which effective control of the pesticide level in the diet could be exercised, is a matter for continuing consideration by others.

A/C. 297/7

June, 1966